National Aeronautics and
Space Administration

Science Committee Report

Dr. Meenakshi Wadhwa
Chair, Science Committee

Science Committee Members

Dr. Meenakshi Wadhwa, Chair, Arizona State University

Dr. Vinton Cerf, Google

Dr. Jeffrey A. Hoffman, Massachusetts Institute of Technology

Dr. Michelle Larson, Adler Planetarium

Dr. Pat Patterson, Space Dynamics Laboratory

Mr. Marc Weiser, RPM Ventures

Dr. Michael Liemohn, University of Michigan, Chair, Heliophysics Advisory Cmte (HPAC)

Dr. Feryal Ozel, University of Arizona, Chair, Astrophysics Advisory Cmte (APAC)

Dr. Anne Verbiscer, University of Virginia, Chair, Planetary Science Advisory Cmte (PAC)

Dr. Thomas Herring, Massachusetts Institute of Technology, Designee for Chair, Earth Science Advisory Cmte (ESAC)

NAC Science Committee Activities (since May2019)

- Presentation to the National Academies Space Studies Board Committee on the NASA SMD Science Plan (August 1, 2019)

- Science Committee telecon (October 18, 2019)
  - SMD programmatic status
  - Response to NAC May 2019 advice
  - SC November meeting priorities

Outline

- **Science Highlights**
- Programmatic Status
- Plan for November Meeting

ICON - Ionospheric Connection Explorer

SCIENCE HIGHLIGHT

Oct. 10, 2019 - Northrop Grumman's L-1011 Stargazer aircraft, with Pegasus XL rocket attached beneath, takes off from the Skid Strip runway at Cape Canaveral Air Force Station in Florida.

Pegasus aft end in flight, prior to drop

ESA/NASA COLLABORATION

SCIENCE HIGHLIGHT

NASA provided:

- Launch: ULA Atlas V 411
- Solar Orbiter Heliospheric Imager (**SoloHI**)
- Heavy Ion Sensor (**HIS**) - part of Solar Wind Analyzer suite
- Contributions to the Energetic Particle Detector Suite
- Contributions to Spectral Imaging of the Coronal Environment (**SPICE**)

SOLAR ORBITER

Observing the Sun from new vantage points

Solar Orbiter Collaboration

Above: ESA's Solar Orbiter at IABG in Ottobrunn, Germany, at the conclusion of final Integration & Test

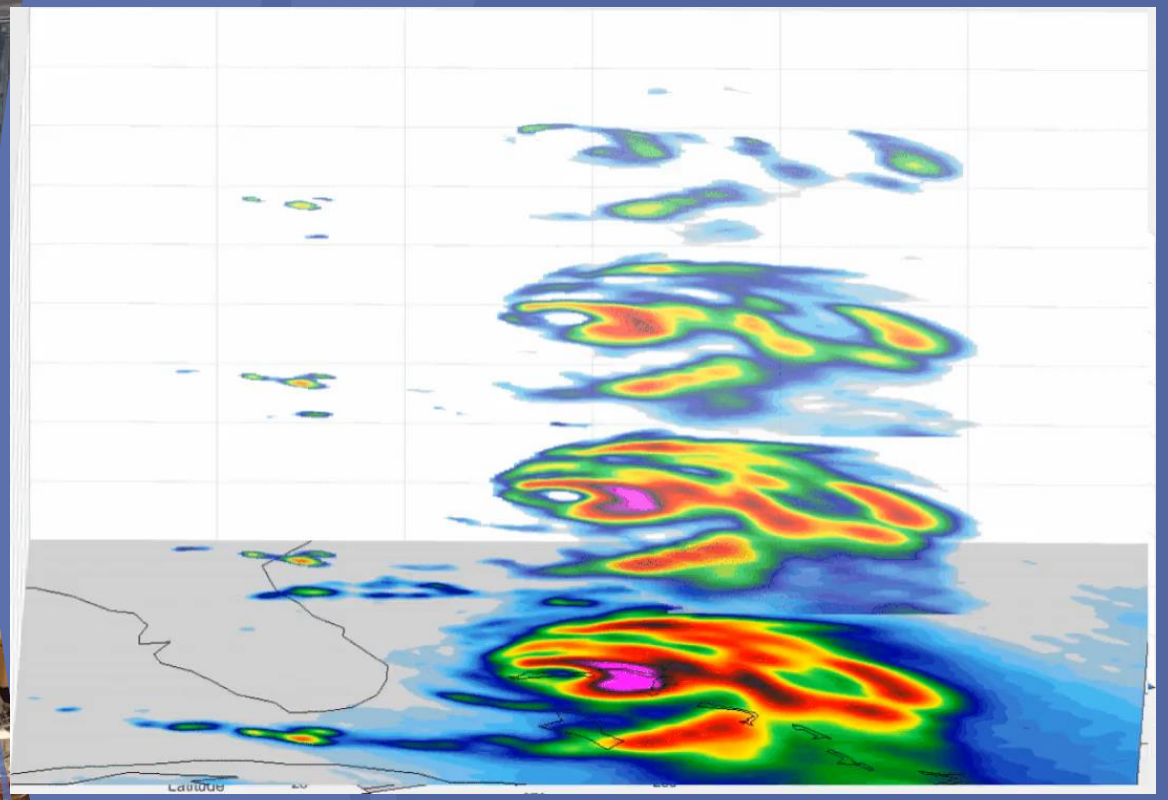
To be launched from SLC-41 Cape Canaveral in February 2020.

- The planned arrival on orbit will be during the 5th orbit of Parker Solar Probe and the in-situ instruments will be operational to support the PSP perihelion
- NASA has released an interdisciplinary science team call to maximize the science return of the unique partnership of Parker Solar Probe and Solar Orbiter
- ***Next milestone***: Arrival at KSC on Nov 1, 2019 (TODAY!!)

Note: There is potential for Commercial Crew Orbital Flight Test (OFT) to impact the Solar Orbiter launch window of February 5-23, 2020

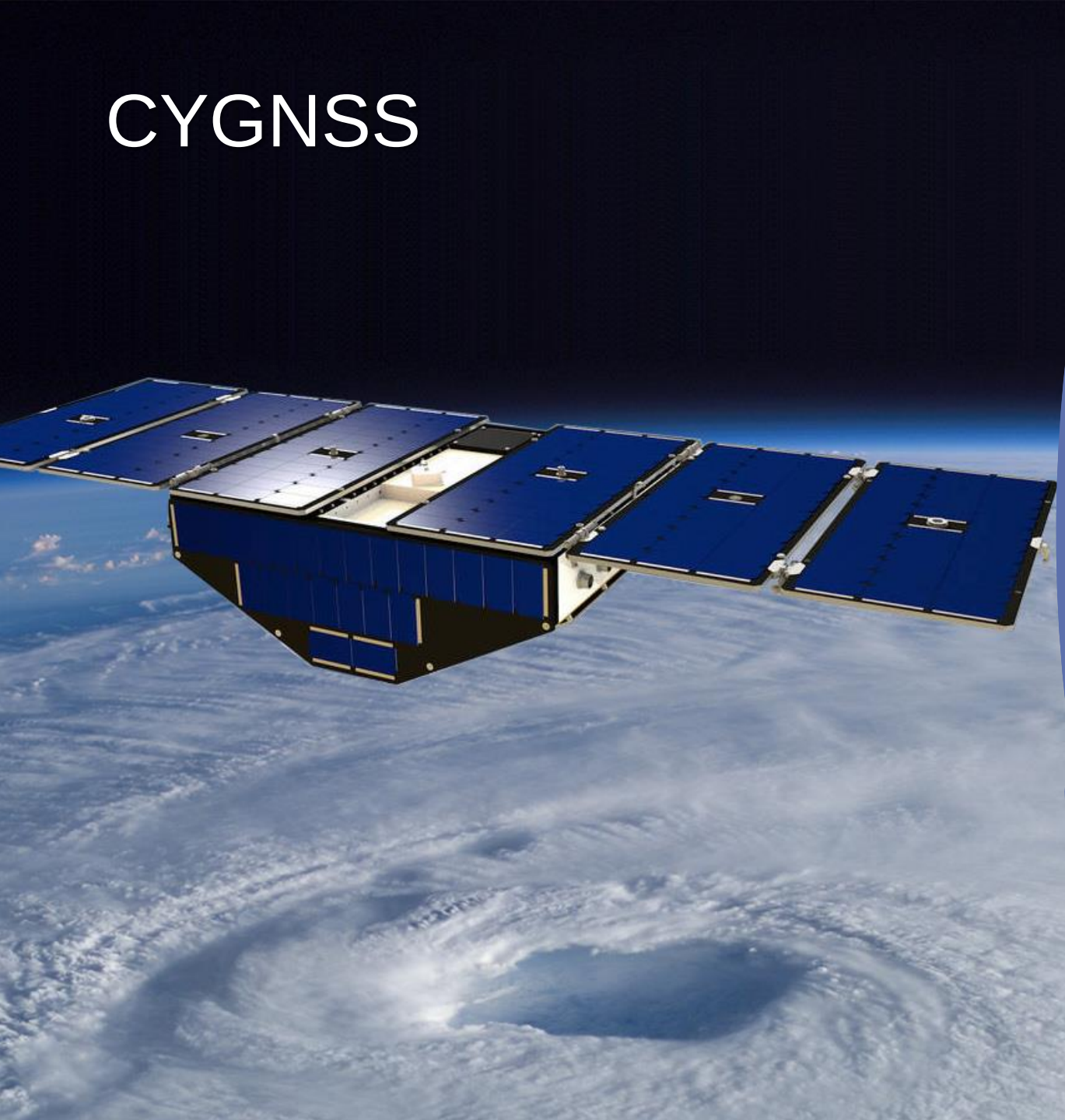
TEMPEST-D

SCIENCE HIGHLIGHT

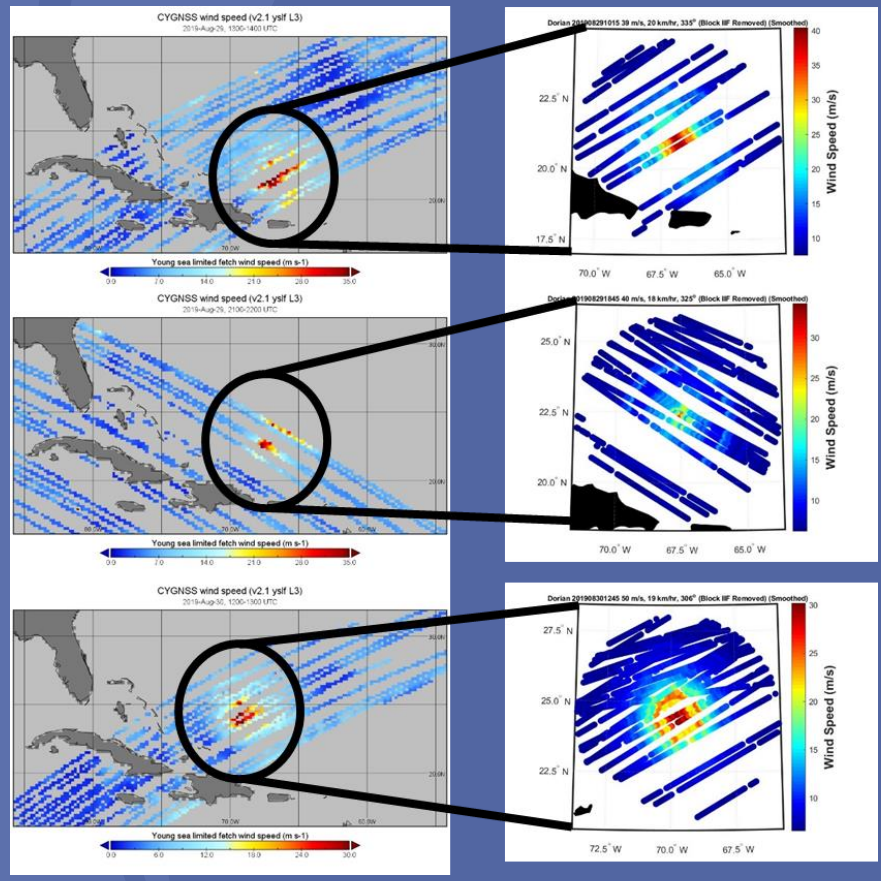


Sep. 5, 2019 –Layers inside Hurricane Dorian as seen by Tempest-D with yellow, red and pink indicating areas of most intense rainfall

CYGNSS



SCIENCE HIGHLIGHT



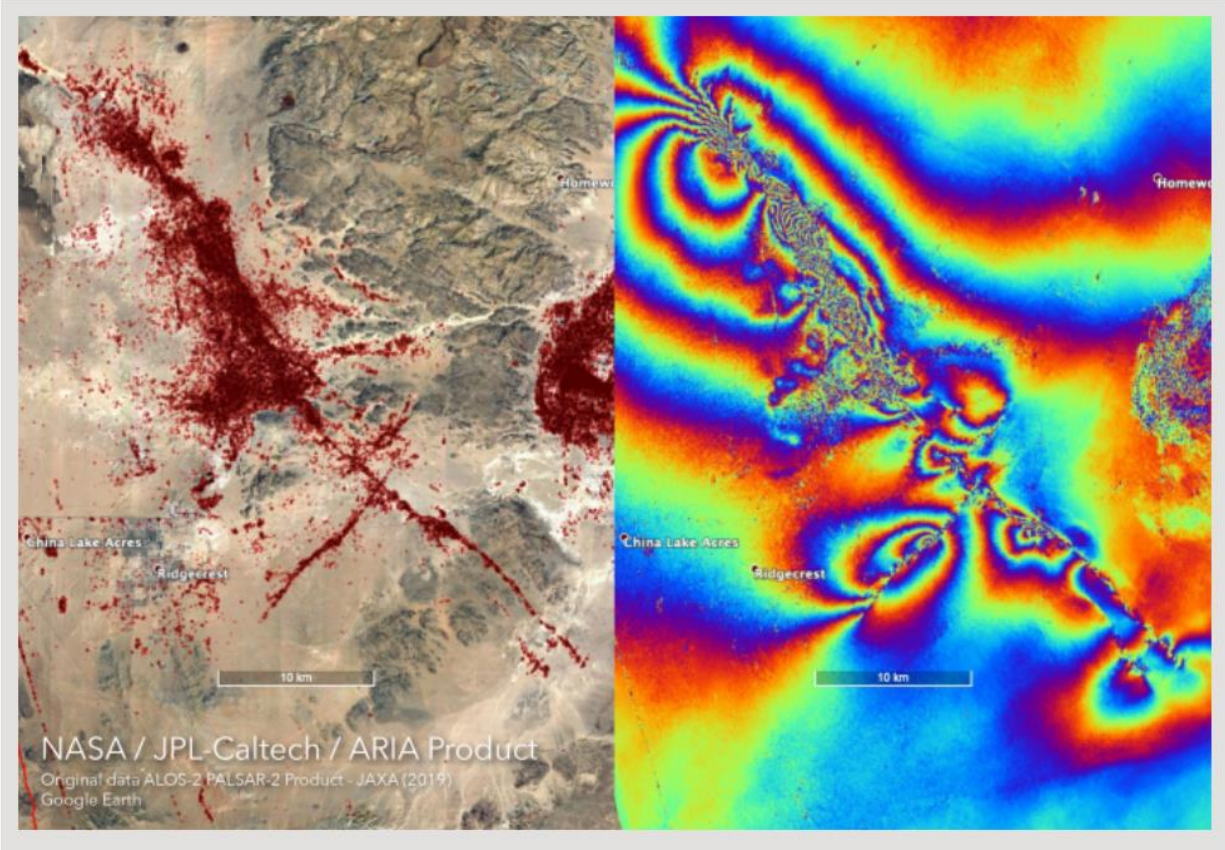
August 29-30, 2019 - CYGNSS overpass of Hurricane Dorian. Intensity and storm center location (Top); Hourly background wind field, Level 3 gridded data product (Middle); 3-hr inner core wind field (Bottom)

ALOS-2

SCIENCE HIGHLIGHT

July 4th M6.4, July 5th M7.1 and over 80,000 aftershocks !

NASA decorrelation map shows surface rupture and disturbance in red



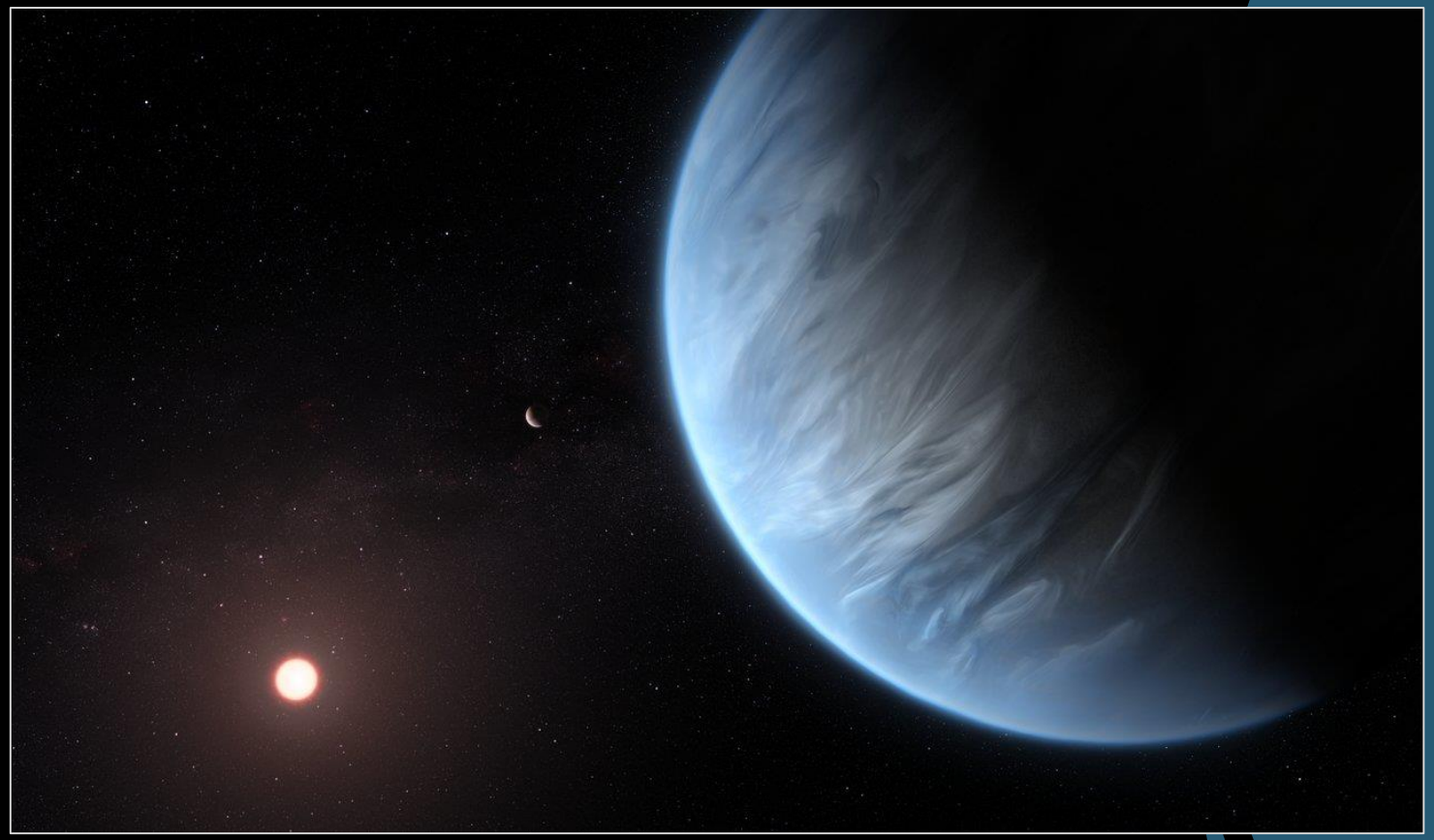
Earthquake Rips through the California Desert

NASA Response provides Science Awareness to Decision Support

"Kaleidoscopic satellite image" LaTimes - providing public awareness on the value of NASA

SCIENCE HIGHLIGHT

Hubble Finds Water Vapor on Habitable-Zone Exoplanet for the First Time



This artist's impression shows the planet K2-18b, its host star and an accompanying planet in this system.
Credits: ESA/Hubble, M. Kornmesser

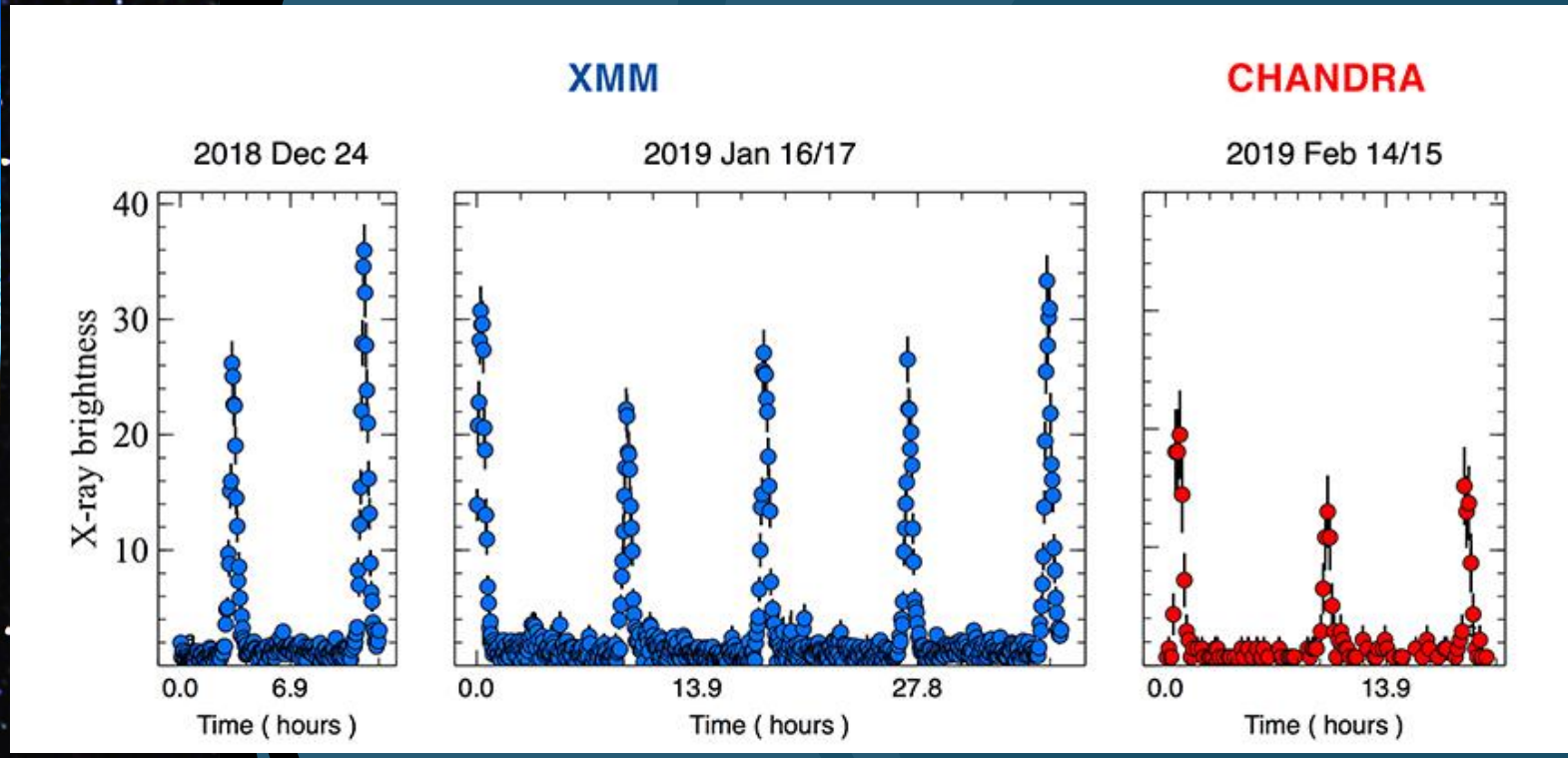
- K2-18b - Exoplanet around a small red dwarf star ~110 light-years away in the constellation Leo.
- Astronomers at University College London used data from NASA's Hubble Space Telescope to find water vapor in the atmosphere of K2-18b.

SCIENCE HIGHLIGHT

Black Hole Has Three Hot Meals a Day!

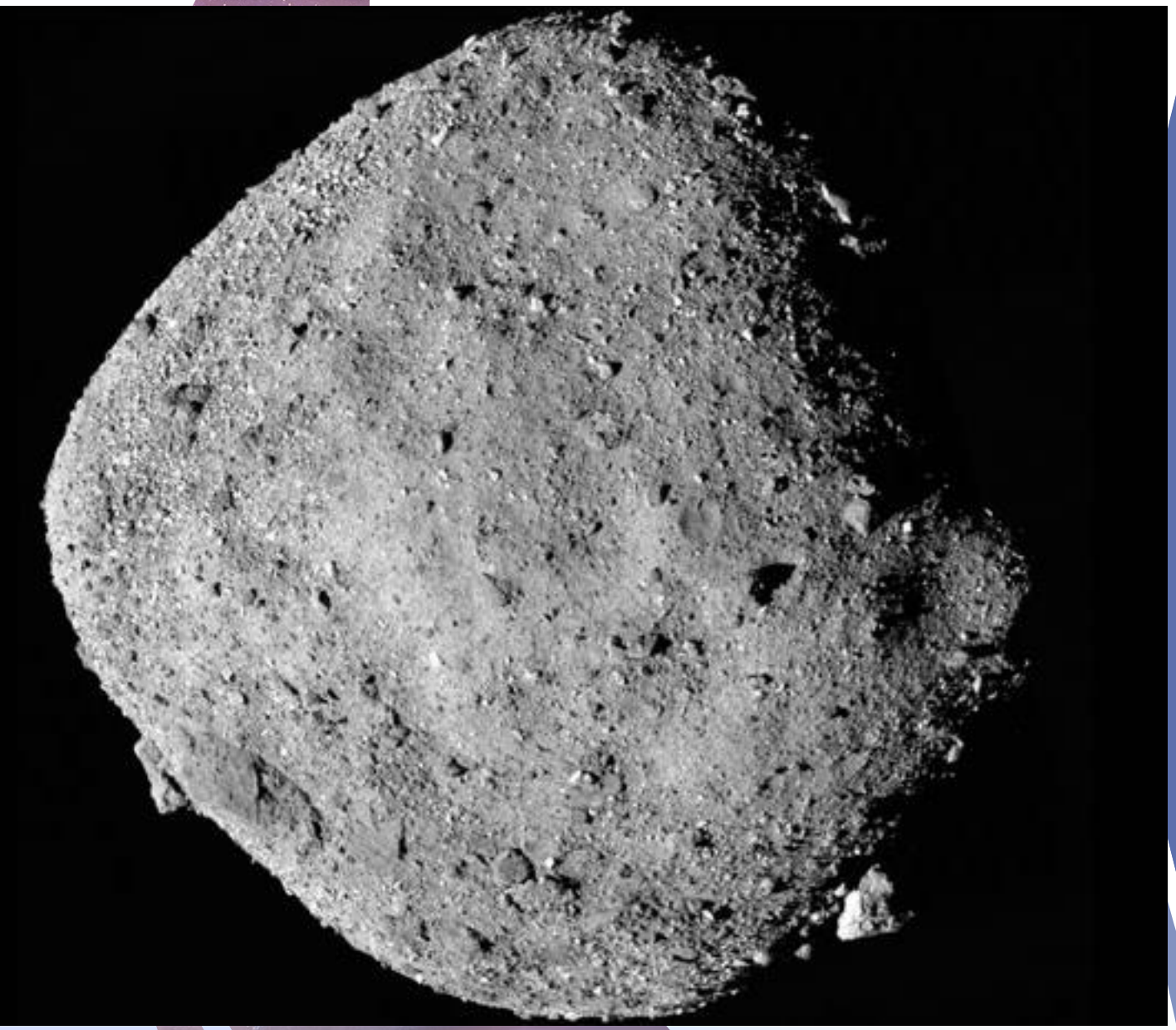
ESA's XMM-Newton

NASA's Chandra X-ray Observatory.
Credit: CXC/NGST

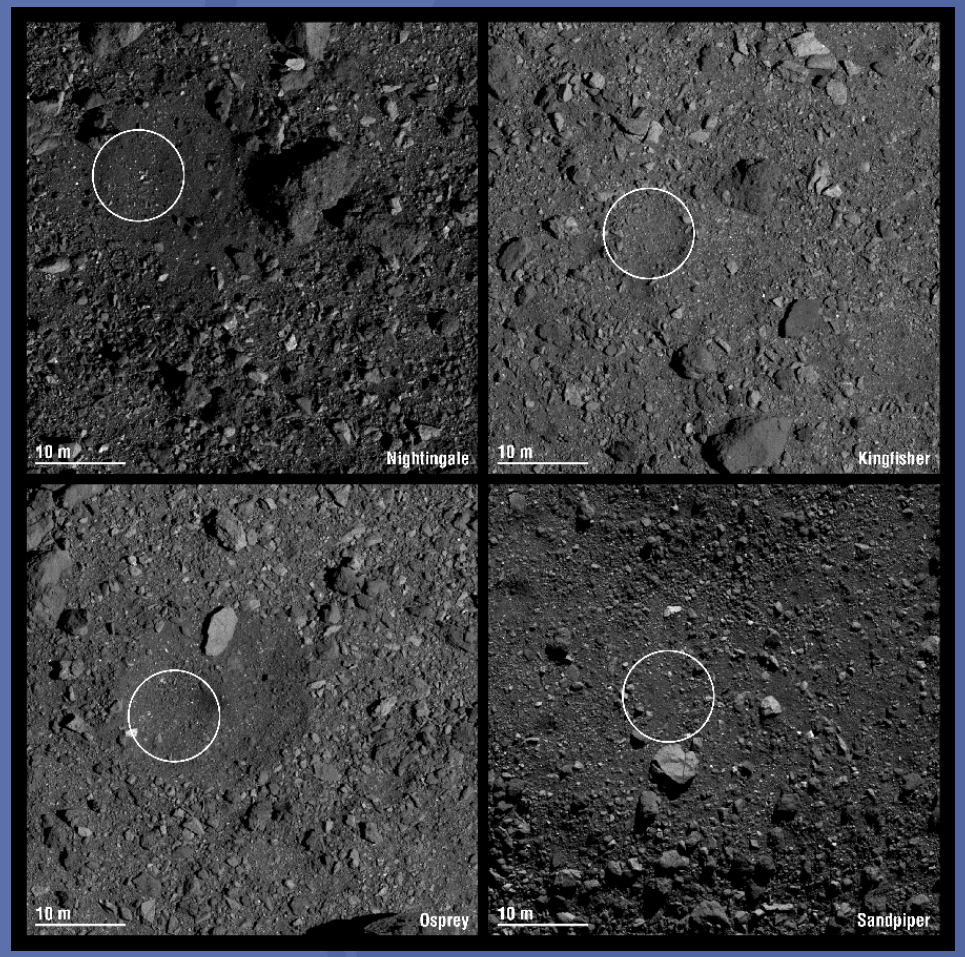


Data from XMM-Newton and Chandra, taken over a span of 54 days, revealed that a supermassive black hole is blasting out X-rays about every nine hours. This indicates that this black hole is consuming significant amounts of material about three times per day. This is the first time such repetitive behavior has been seen in a supermassive black hole.

OSIRIS-REx



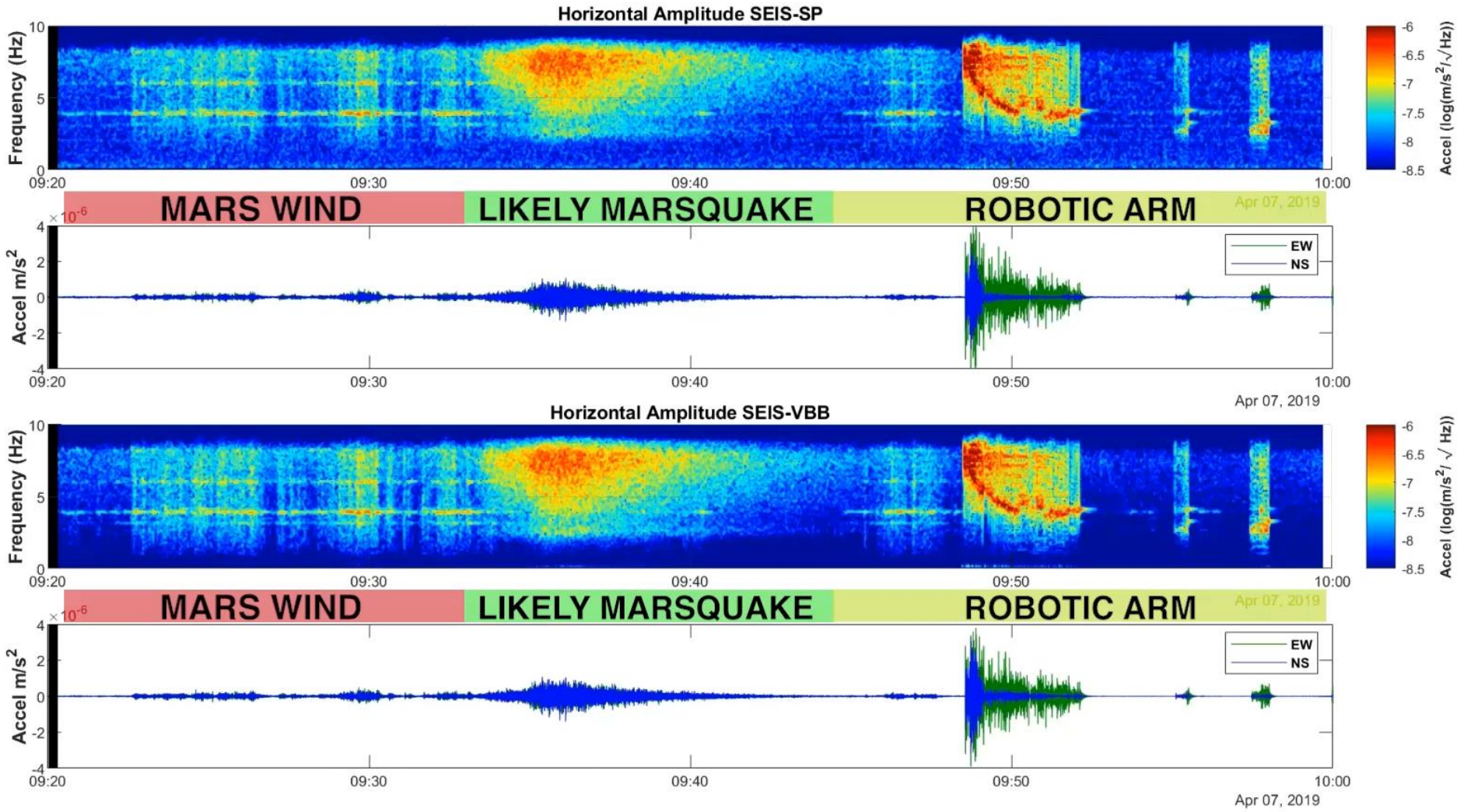
SCIENCE HIGHLIGHT



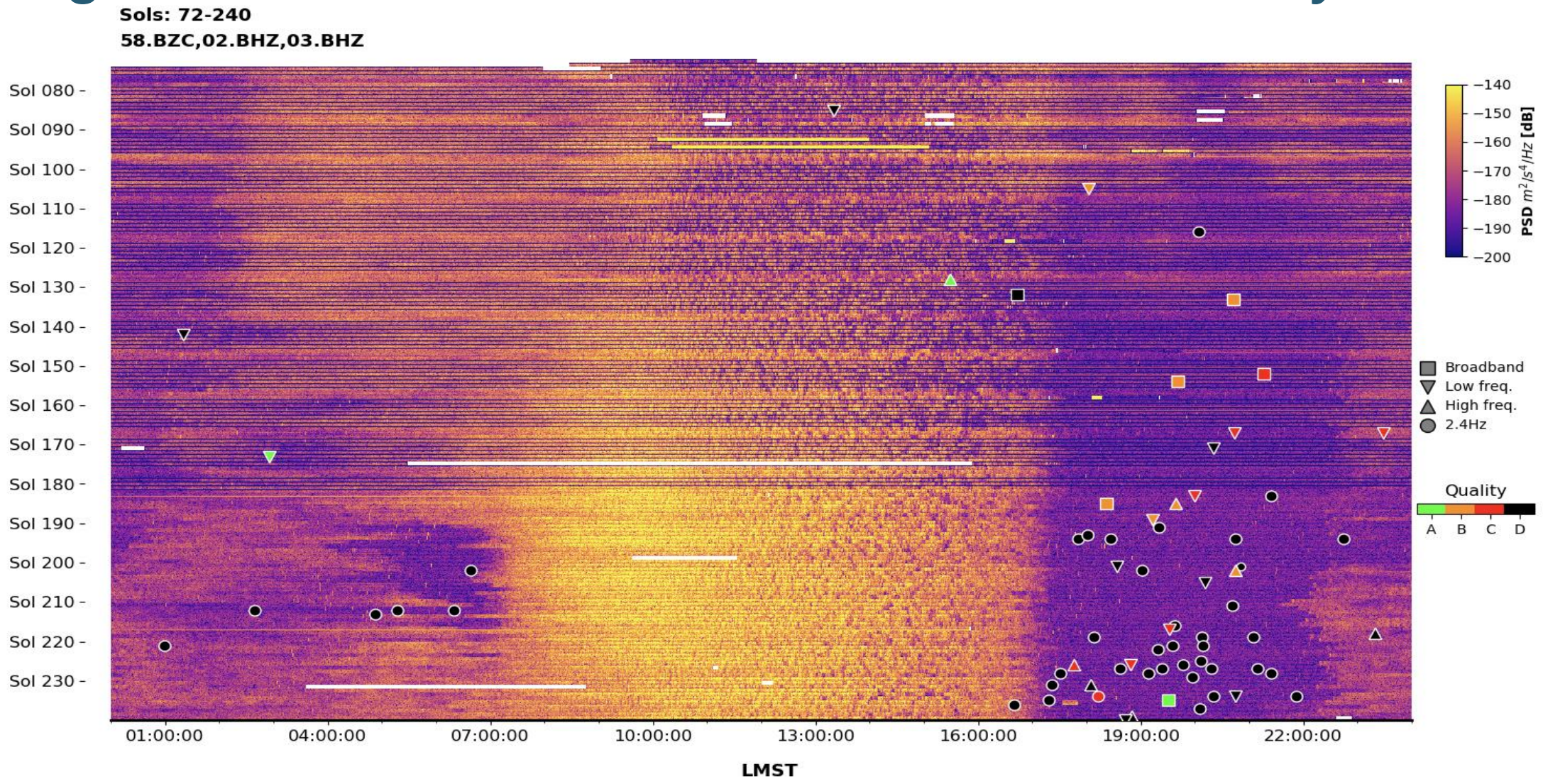
Aug. 12, 2019 - Four candidate sample collection sites on asteroid Bennu selected by NASA's OSIRIS-REx mission

InSight Mission: Three Events on Mars

SCIENCE HIGHLIGHT



InSight Mission: All Detected Events as of July 30, 2019



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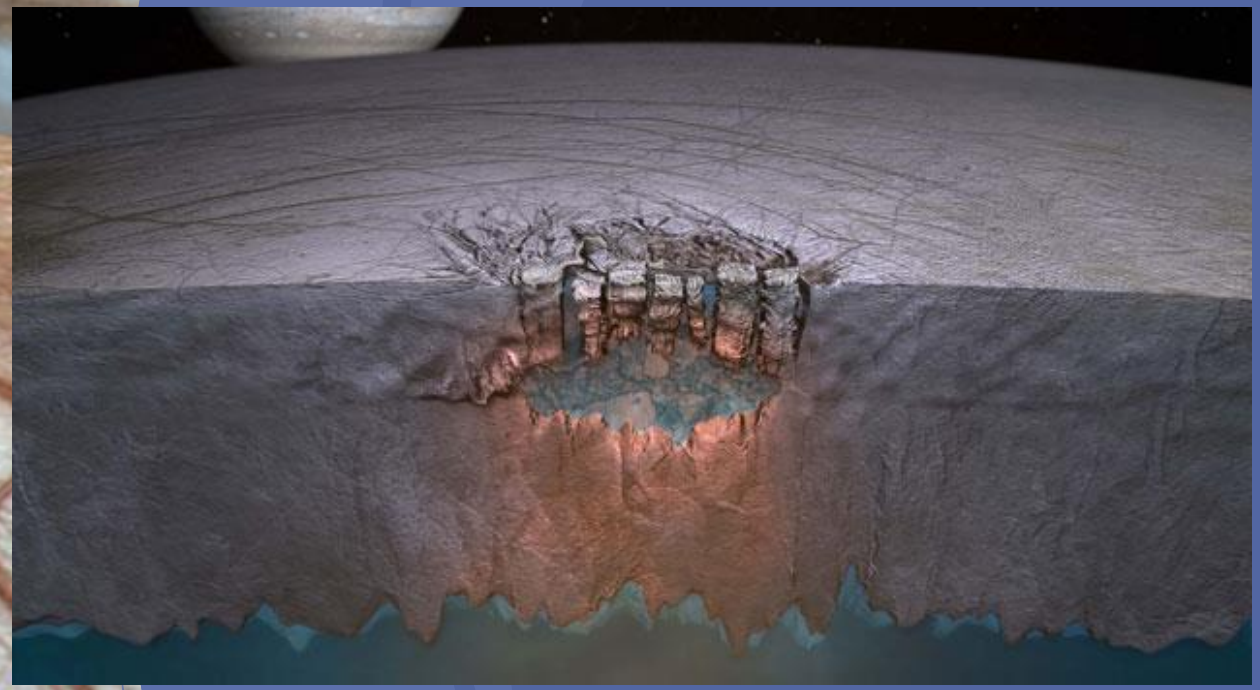
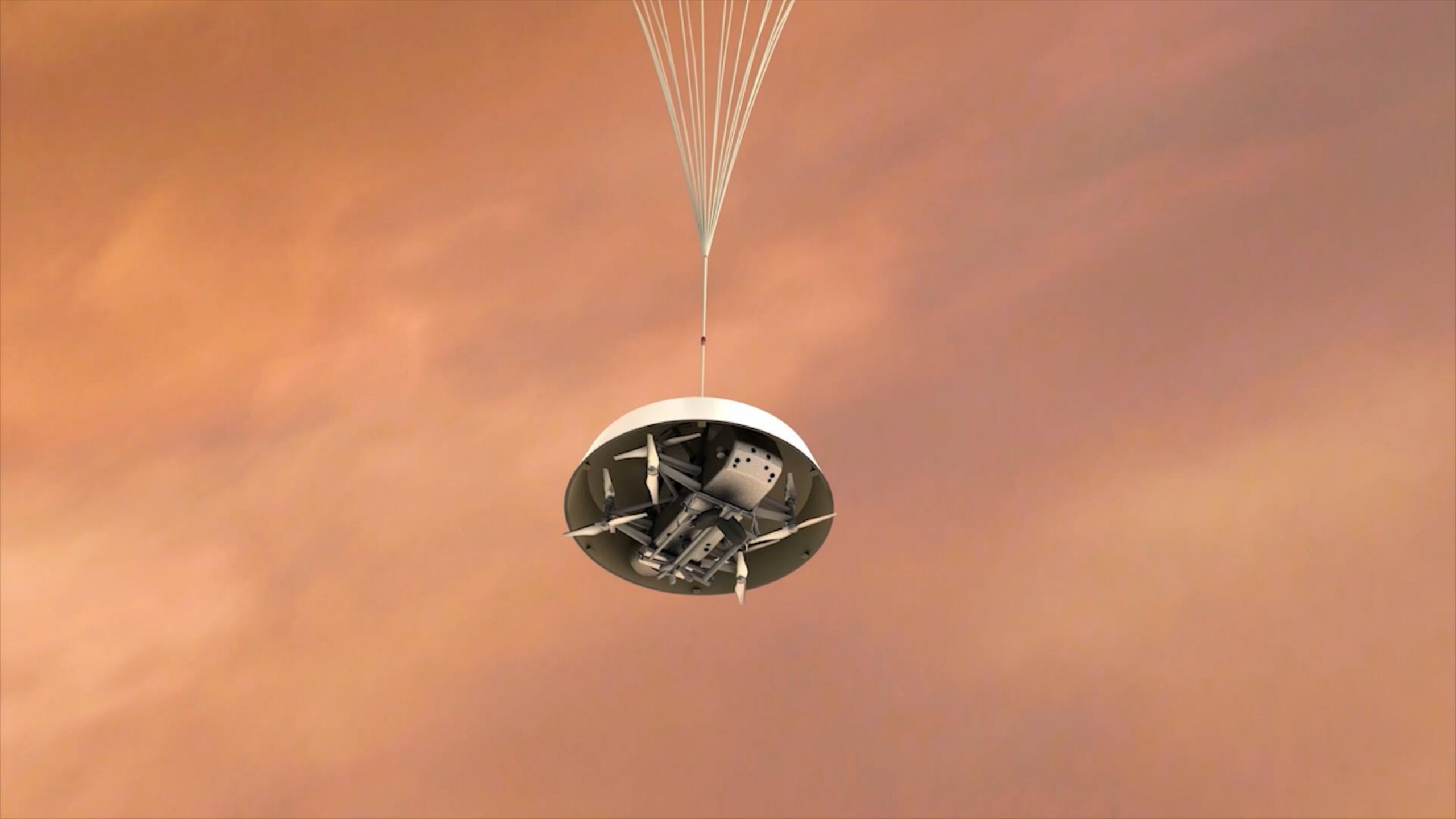
Mars 2020

Sept. 28, 2019 – Engineers and technicians watch as a crane lifts the rocket-powered descent stage away from the Mars 2020 Rover after a test at NASA's Jet Propulsion Laboratory

Europa Clipper



Aug. 19, 2019 – MISSION CONFIRMED
NASA's Europa Clipper mission to study the Jupiter Ocean World has been confirmed, launch date pending for 2020s

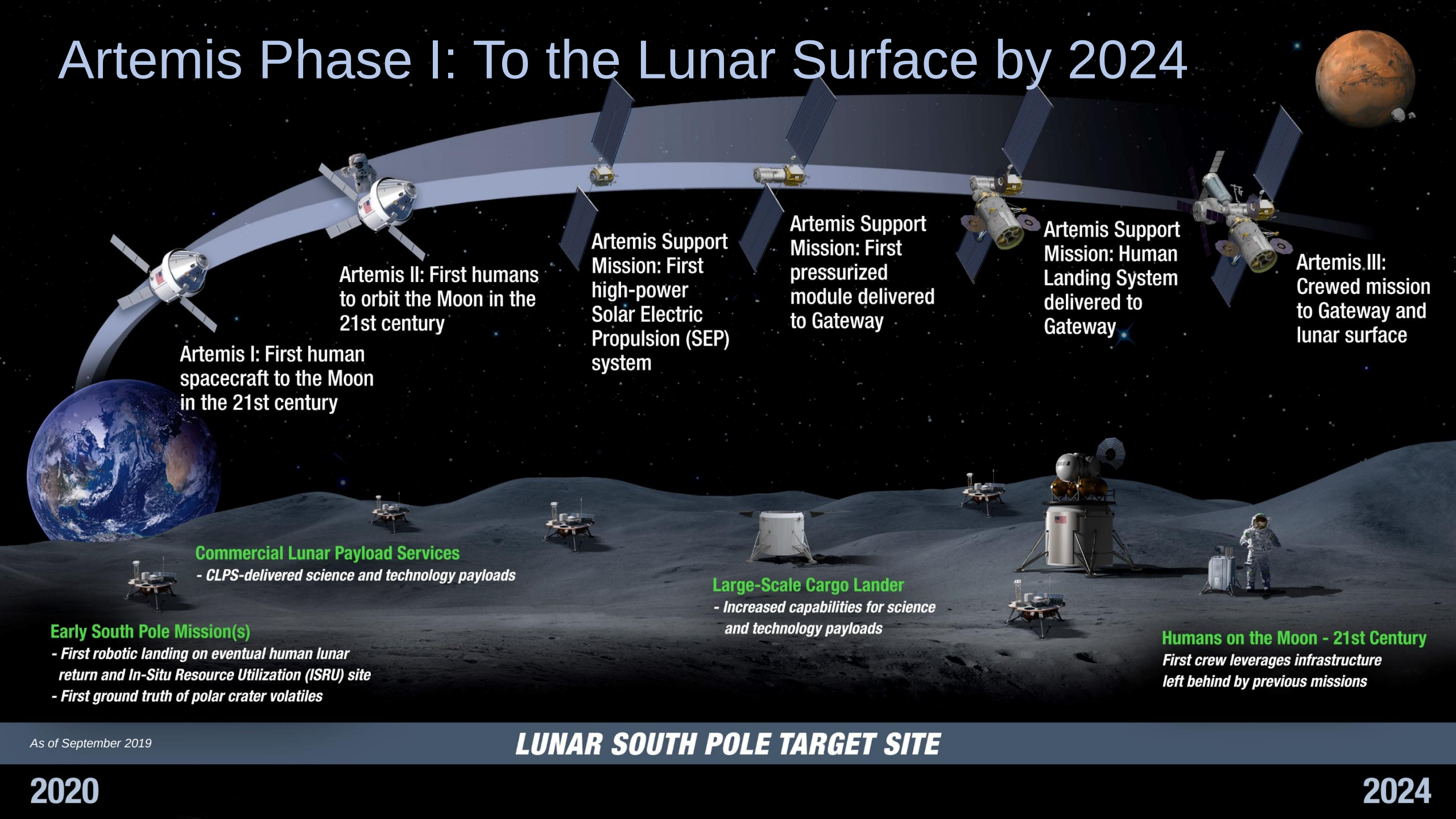


Webb

The James Webb Space Telescope

Aug. 28, 2019 – Engineers in Redondo Beach, Calif., have successfully connected the two halves of NASA's James Webb Space Telescope

Artemis Phase I: To the Lunar Surface by 2024



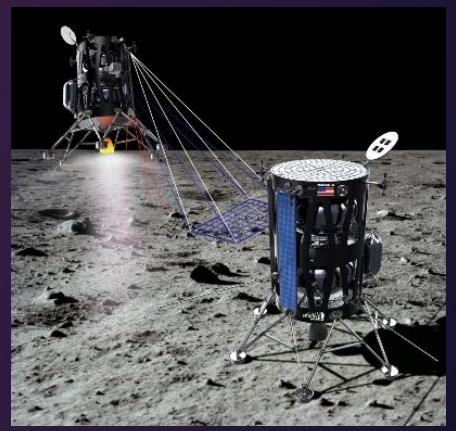
As of September 2019

LUNAR SOUTH POLE TARGET SITE

2020

2024

Commercial Lunar Payload Services (CLPS) Progress



- Nine U.S. companies selected to bid on specific task orders to deliver NASA payloads to the Moon's surface.
- 13 NASA science instrument payloads and 12 payloads developed by academia and industry will be flown as the first four CLPS deliveries, the first of which is set for launch in July 2021.
- Additional companies with enhanced capabilities for getting larger mass to the lunar surface are expected to be on-ramped into the pool of CLPS providers in early November 2019.
- NASA-built VIPER mission (a ~300kg rover focused on volatile discovery and characterization) will be delivered to the lunar surface via a CLPS provider in late 2022.

ISS Cooperative Agreement Independent Review Team (ISS IRT)

- Jointly chartered by SMD and HEOMD
- Will assess the status of NASA's cooperative agreement with Center for the Advancement of Science in Space (CASIS)
- IRT focus is on:
  - Clarity of purpose
  - Alignment to mission
  - Challenges to mission
  - Opportunities to increase/accelerate commercialization
  - Recommend path forward
- Chair: Dr. Betsy Cantwell, Univ of Arizona
- Final report to NASA expected in early 2020

SMD Response to May 2019 SC Advice

Findings: Draft Science Strategy on the Moon

Findings: Draft NASA Science Plan

Findings: Science and Technology Definition Teams

Recommendation: Multi-Tiered Strategy to Facilitate Diverse Teams and Safe Environments

Found here:

https://smd-prod.s3.amazonaws.com/science-red/s3fs-public/atoms/files/NAC%20Rec%20Findings%20to%20SMD%20May%202019.pdf

Recommendation:

The Science Committee (SC) recommends that SMD develop a multi-tiered strategy to facilitate diverse teams and safe environments.

To achieve these goals, the SC recommends the following actions:

- We strongly encourage the development of a 5-year strategic plan for diversity, equity, and inclusion (DEI), as a first step in the process.
- We strongly endorse the continuation of the "PI 101" and "PI Incubator" programs recently developed by NASA SMD.
- NASA SMD should continue its DEI-enlightened proposal review processes, including diverse review panels, providing DEI training at the beginning of every proposal review, the clear explanation of evaluation criteria, and the enforcement of these policies and criteria throughout the panels.
- NASA SMD Announcements of Opportunity should include a required element of how the proposed activities and proposal team aligns with NASA's DEI goals.

SMD Response to SC Recommendation: Diverse Teams / Safe Environments

- Grant terms and conditions in NASA-funded research
- Discovery and New Frontiers language on career development
- Development of the next generation of mission Principal Investigators (PIs), including PI-Workshops
- Strategic actions to reduce bias in proposal evaluations, including dual anonymous review
- Team operational changes to create more inclusive environments

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NAC Science Committee Meeting November 18-19, 2019

- Moon to Mars update
- Planetary Protection Independent Review Board (PPIRB) report
- SMD Research and Analysis Innovations
  - Proposal and Selection Metrics
  - High Risk/High Impact Research
  - Dual Anonymous Reviews
- Assessment of NASA SMD Science Activation Program by National Academy of Sciences